

Figure 1

$$\begin{array}{c}
 \begin{array}{c} \curvearrowright 202 \\
 H = \begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 1 & 1 & 0 & 0 & 0 \\
 0 & 0 & 1 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \\
 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 1 & 1 \\
 1 & 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 0 \\
 1 & 1 & 0 & 0 & 1 & 0 & 1 & 0 & 1 & 1 \end{bmatrix} \\
 \end{array}
 \end{array}
 \quad
 \begin{array}{c}
 \begin{array}{c} \curvearrowright 206 \\
 X = \begin{bmatrix} X_1 \\
 X_2 \\
 X_3 \\
 X_4 \\
 X_5 \\
 X_6 \\
 X_7 \\
 X_8 \\
 X_9 \\
 X_{10} \end{bmatrix} \\
 \end{array}
 \end{array}
 \quad
 \begin{array}{c}
 \begin{array}{c} \curvearrowright 208 \\
 \begin{bmatrix} l_1 & l_4 & l_7 & l_{10} & 0 & l_{16} & l_{19} & 0 & 0 & 0 \\
 0 & 0 & l_8 & l_{11} & l_{13} & 0 & l_{20} & l_{22} & 0 & l_{28} \\
 0 & l_5 & 0 & l_{12} & 0 & l_{17} & 0 & l_{23} & l_{25} & l_{29} \\
 l_2 & 0 & l_9 & 0 & l_{14} & l_{18} & 0 & l_{24} & l_{26} & 0 \\
 l_3 & l_6 & 0 & 0 & l_{15} & 0 & l_{21} & 0 & l_{27} & l_{30} \end{bmatrix} \\
 \end{array}
 \end{array}
 \quad
 \begin{array}{c}
 \begin{array}{c} \curvearrowright 210 \\
 \begin{bmatrix} l_1 & l_2 & l_3 & l_4 & 0 & l_5 & l_6 & 0 & 0 & 0 \\
 0 & 0 & l_7 & l_8 & l_9 & 0 & l_{10} & l_{11} & 0 & l_{12} \\
 0 & l_{13} & 0 & l_{14} & 0 & l_{15} & 0 & l_{16} & l_{17} & l_{18} \\
 l_{19} & 0 & l_{20} & 0 & l_{21} & l_{22} & 0 & l_{23} & l_{24} & 0 \\
 l_{25} & l_{26} & 0 & 0 & l_{27} & 0 & l_{28} & 0 & l_{29} & l_{30} \end{bmatrix} \\
 \end{array}
 \end{array}
 \end{array}$$

Figure 2

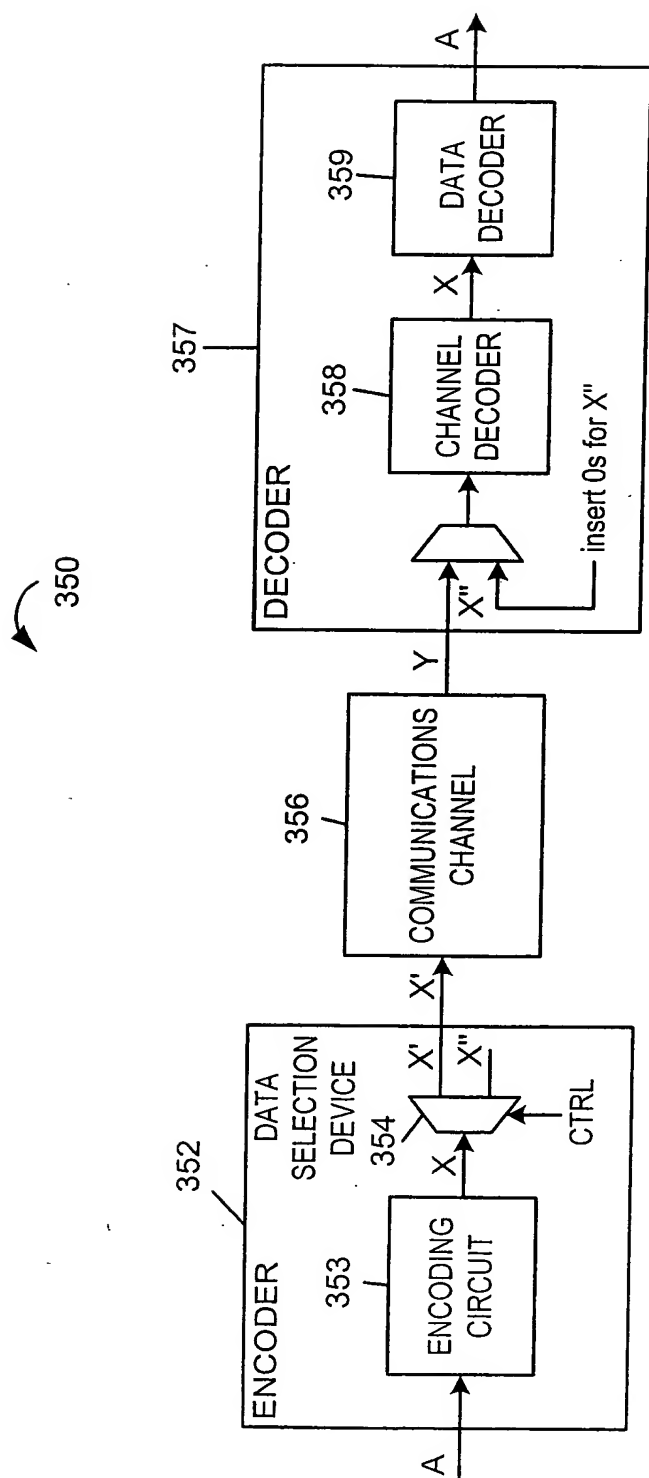


Fig. 3

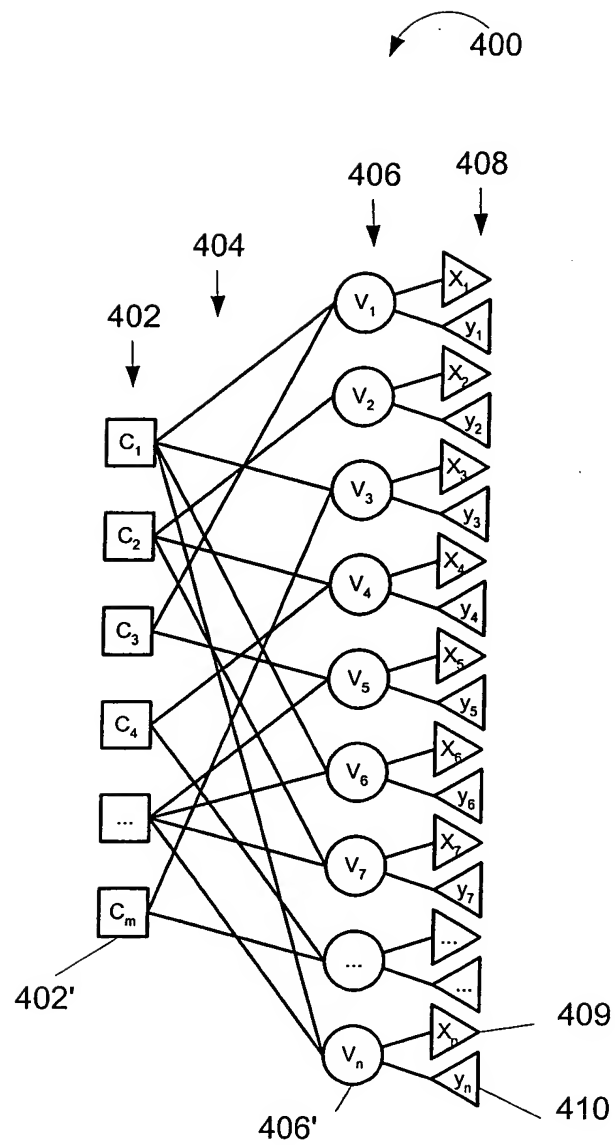


Figure 4

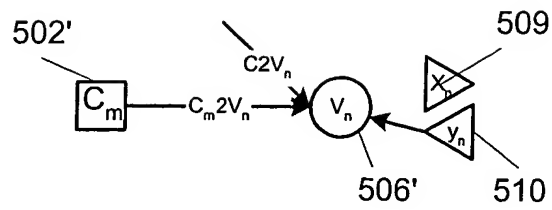


Figure 5a

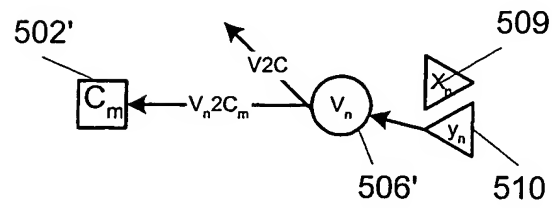


Figure 5b

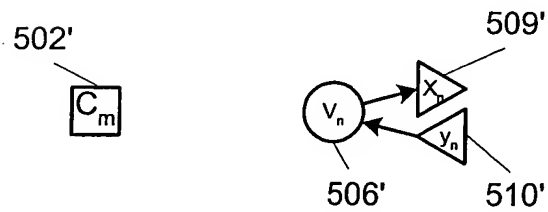


Figure 5c

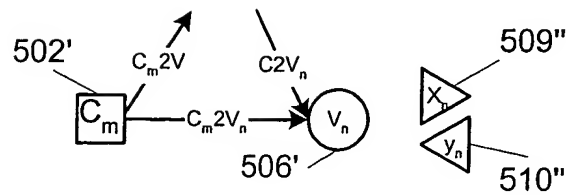


Figure 5d

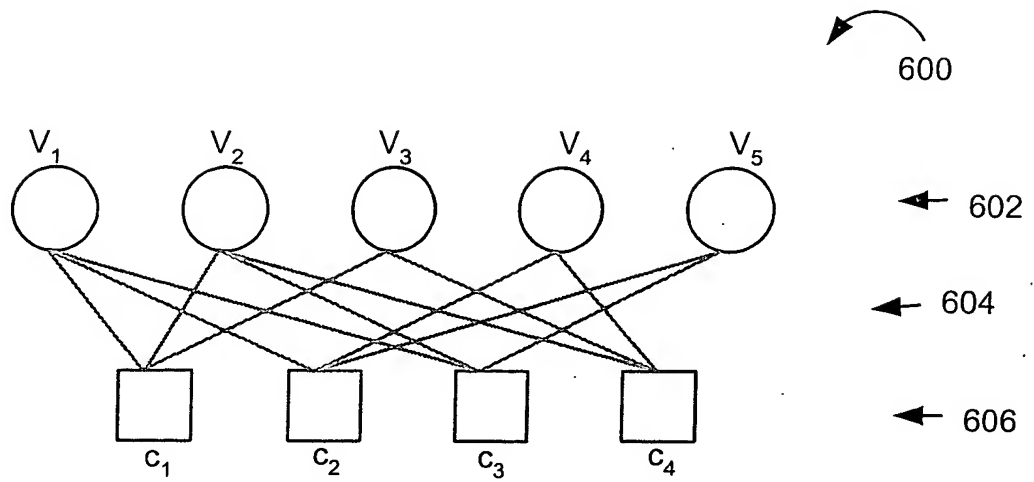
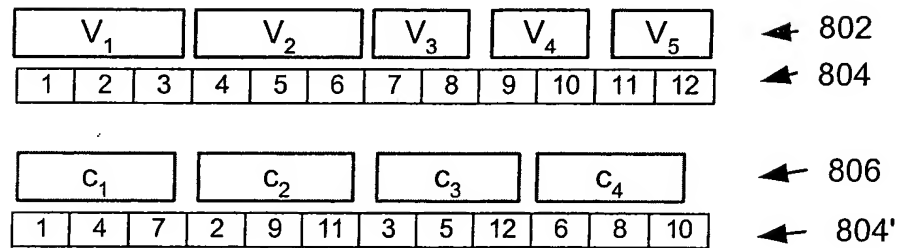


Figure 6

$$\begin{aligned}
 & \xrightarrow{702} H = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 & 0 \end{bmatrix} \quad \xrightarrow{704} x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} \quad \xrightarrow{706} \begin{bmatrix} 1_1 & 1_4 & 1_7 & 0 & 0 \\ 1_2 & 0 & 0 & 1_9 & 1_{11} \\ 1_3 & 1_5 & 0 & 0 & 1_{12} \\ 0 & 1_6 & 1_8 & 1_{10} & 0 \end{bmatrix} \quad \xrightarrow{708} \begin{bmatrix} 1_1 & 1_2 & 1_3 & 0 & 0 \\ 1_4 & 0 & 0 & 1_5 & 1_6 \\ 1_7 & 1_8 & 0 & 0 & 1_9 \\ 0 & 1_{10} & 1_{11} & 1_{12} & 0 \end{bmatrix}
 \end{aligned}$$

Figure 7



Edge permutation representation - edges enumerated from variable node side.

Figure 8

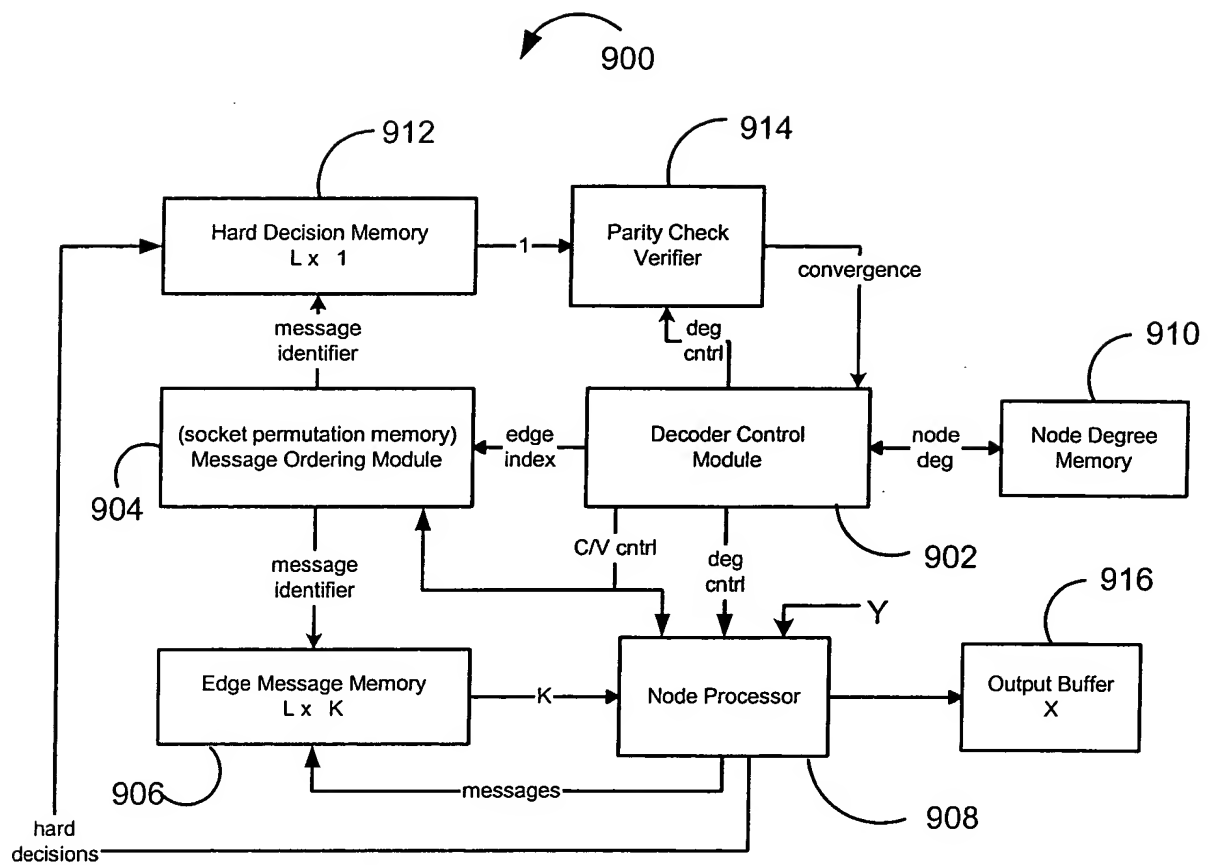


Figure 9

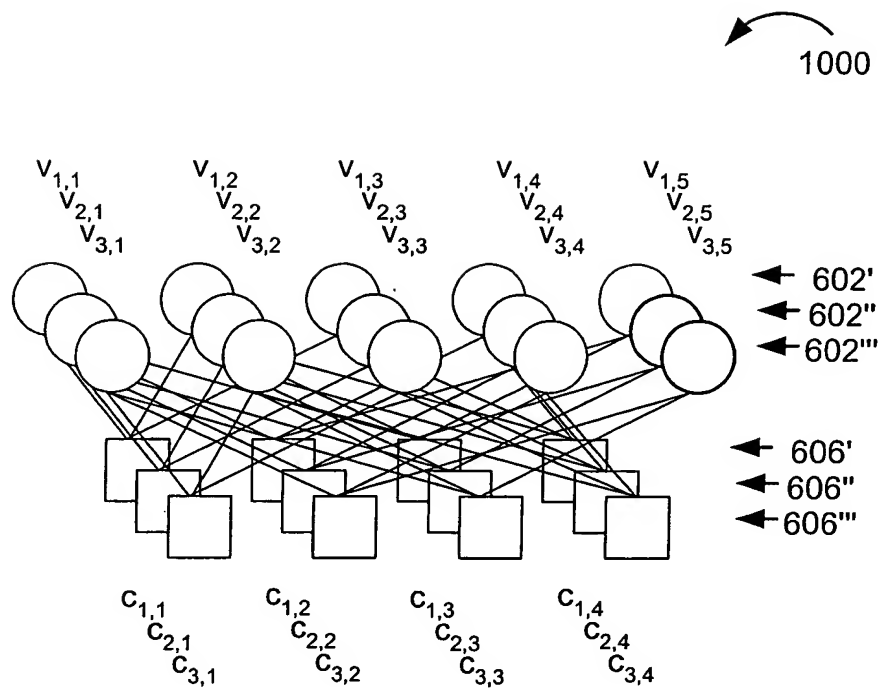


Figure 10

1102

1104

$$H = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$x = \begin{bmatrix} x_{1,1} \\ x_{2,1} \\ x_{3,1} \\ x_{1,2} \\ x_{2,2} \\ x_{3,2} \\ x_{1,3} \\ x_{2,3} \\ x_{3,3} \\ x_{1,4} \\ x_{2,4} \\ x_{3,4} \\ x_{1,5} \\ x_{2,5} \\ x_{3,5} \end{bmatrix}$$

Figure 11

	V ₁			V ₂			V ₃		V ₄		V ₅		
v ₁	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9	1,10	1,11	1,12	← 1202'
v ₂	2,1	2,2	2,3	2,4	2,5	2,6	2,7	2,8	2,9	2,10	2,11	2,12	← 1202"
v ₃	3,1	3,2	3,3	3,4	3,5	3,6	3,7	3,8	3,9	3,10	3,11	3,12	← 1202'''

	C ₁			C ₂			C ₃			C ₄			
c ₁	1,1	1,4	1,7	1,2	1,9	1,11	1,3	1,5	1,12	1,6	1,8	1,10	← 1204'
c ₂	2,1	2,4	2,7	2,2	2,9	2,11	2,3	2,5	2,12	2,6	2,8	2,10	← 1204"
c ₃	3,1	3,4	3,7	3,2	3,9	3,11	3,3	3,5	3,12	3,6	3,8	3,10	← 1204'''

Figure 12

1302
↙

$$H = \begin{bmatrix} 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Figure 13

	x ₁			x ₂			x ₃		x ₄		x ₅		
x ₁	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9	1,10	1,11	1,12	← 1402'
x ₂	2,1	2,2	2,3	2,4	2,5	2,6	2,7	2,8	2,9	2,10	2,11	2,12	← 1402''
x ₃	3,1	3,2	3,3	3,4	3,5	3,6	3,7	3,8	3,9	3,10	3,11	3,12	← 1402'''

	c ₁			c ₂			c ₃			c ₄			
c ₁	2,1	2,4	3,7	3,2	1,9	1,11	1,3	3,5	2,12	1,6	2,8	3,10	← 1404'
c ₂	3,1	3,4	1,7	1,2	2,9	2,11	2,3	1,5	3,12	2,6	3,8	1,10	← 1404''
c ₃	1,1	1,4	2,7	2,2	3,9	3,11	3,3	2,5	1,12	3,6	1,8	2,10	← 1404'''

Figure 14

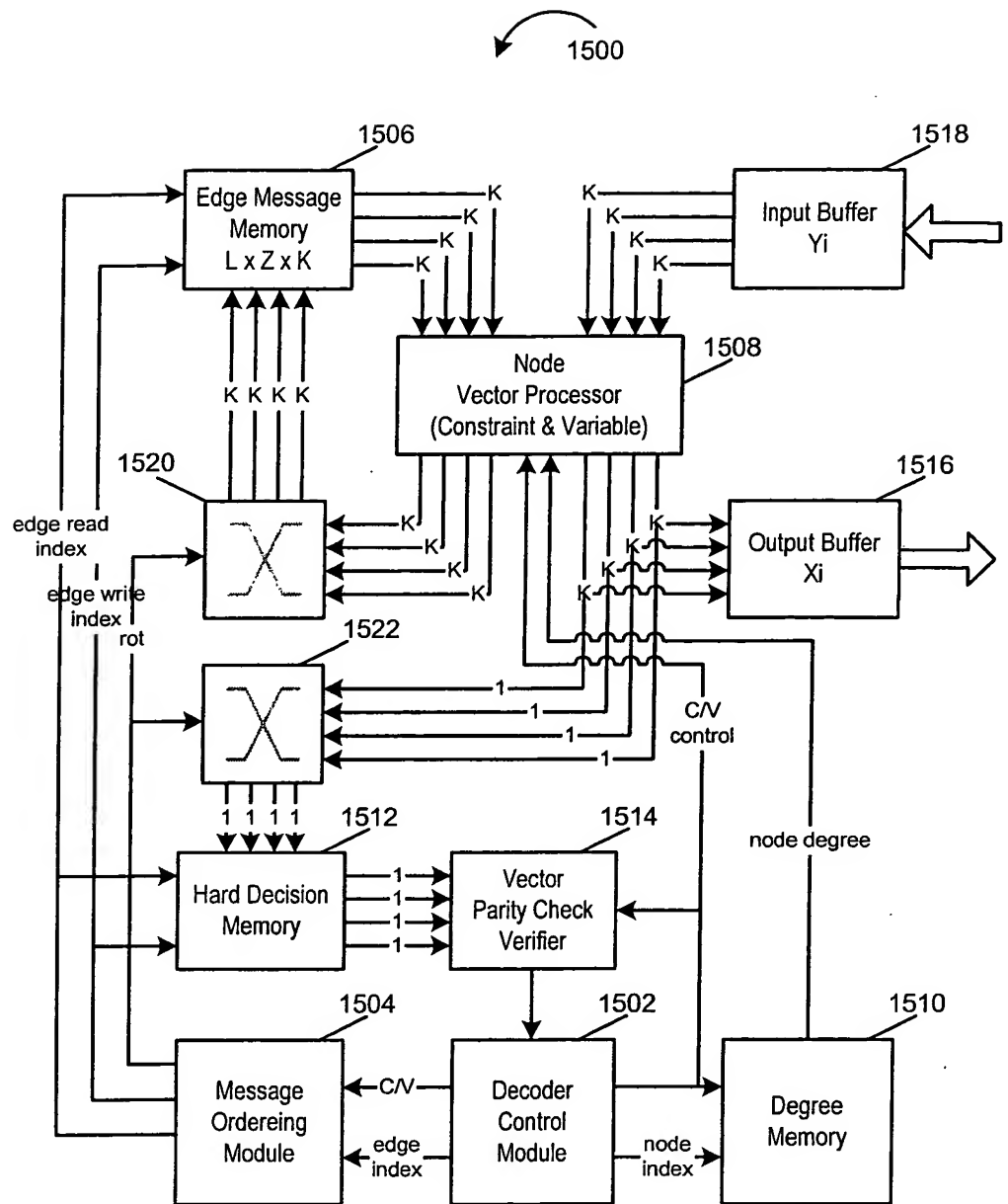


Figure 15

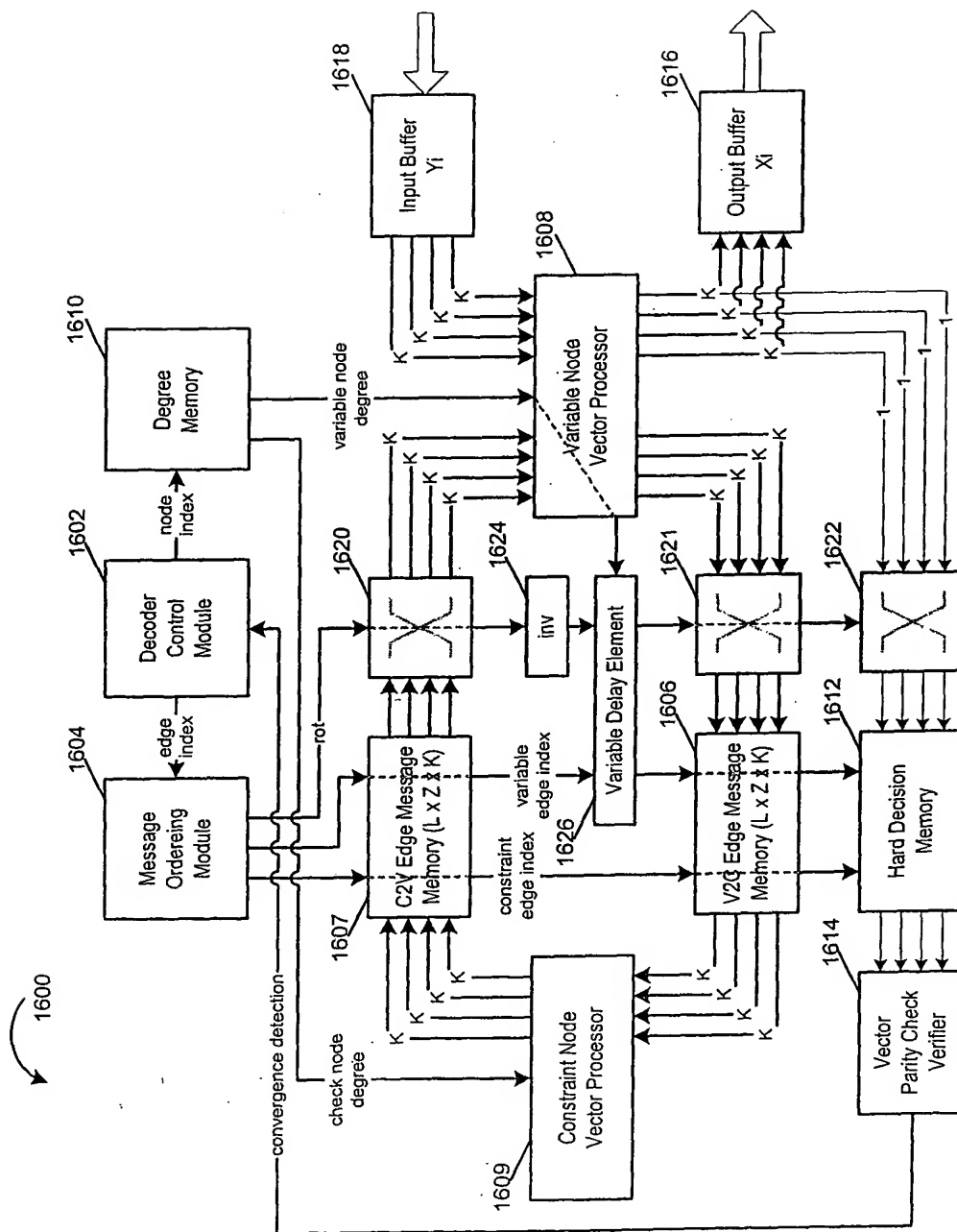


Figure 16

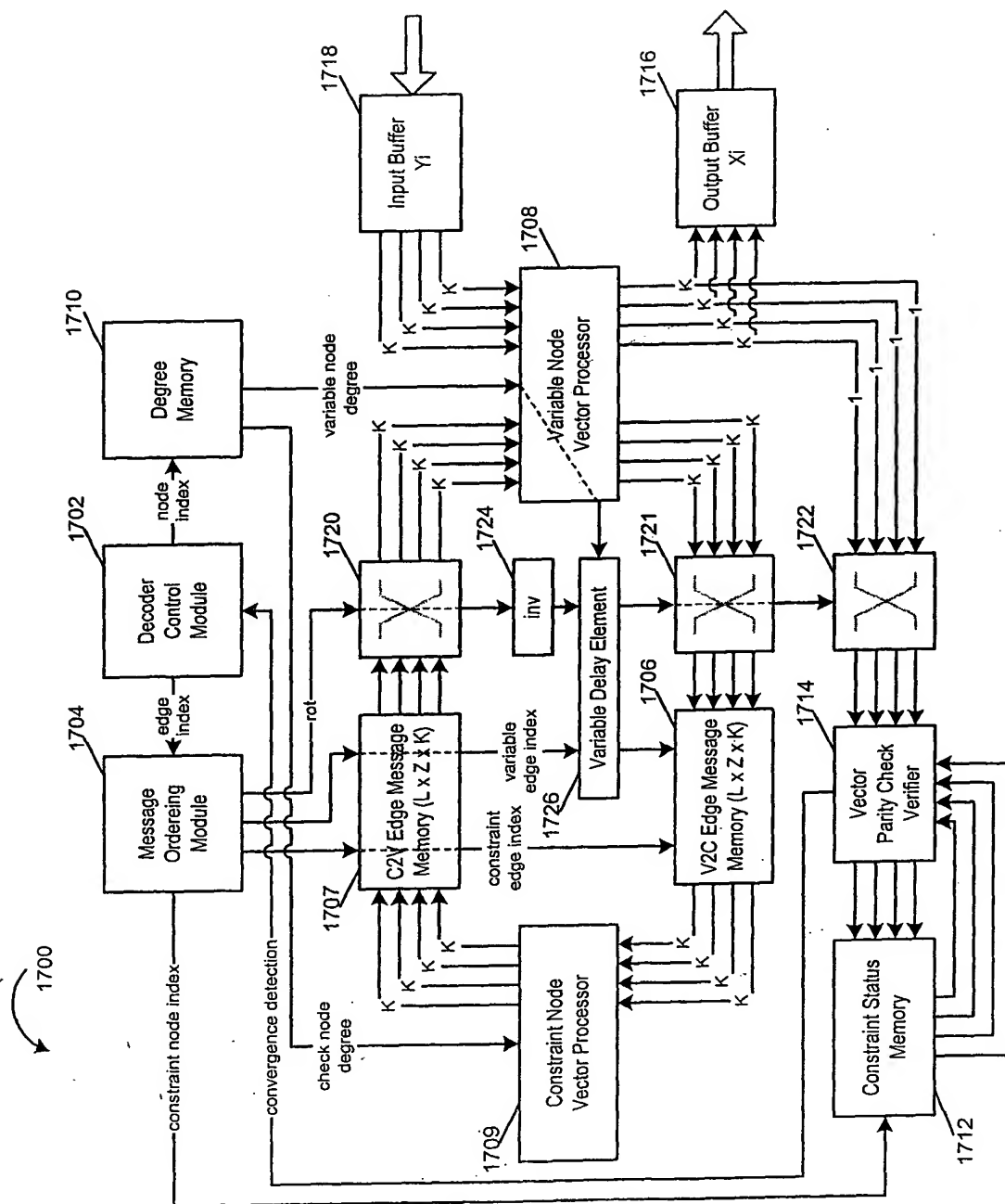


Figure 17